

THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor : Weissert)
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Filed : 1/5/98)
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Patent No. : 5,915,841)
)) Application for
For : Compliant Foil Fluid Film Radial)
 Bearing)
) Broadening
) Reissue
Examiner :)
))
Art Unit :)
)

Box REISSUE
Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Please enter the amendments to the above referenced application and consider the remarks presented herein:

In the Specification

Please delete the paragraph beginning in column 2, line 13.

Please delete the paragraph beginning in column 2, line 16.

At column 2, line 13 please insert:

-- The present invention includes a compliant foil fluid film radial bearing having a bushing with an interior bore including a one or more of equally spaced generally T-shaped retainers axially extending in the interior bore and a like plurality of lobes between adjacent generally T-shaped retainers, and a shaft rotatably supported within the interior bore of the bushing, and a plurality of compliant foils, with an individual compliant foil disposed in the interior bore of the bushing between adjacent

generally T-shaped retainers, and a plurality of foil undersprings, with an underspring disposed beneath each of the compliant foils between adjacent generally T-shaped retainers.

In another embodiment, the present invention includes a compliant foil fluid film radial bearing having a bushing with an interior bore including a plurality of generally T-shaped retainers axially extending in the interior bore, and a plurality of compliant foils, with an individual compliant foil disposed in the interior bore of the bushing between adjacent generally T-shaped retainers; and a plurality of foil undersprings, with an underspring disposed beneath each of the compliant foils between adjacent generally T-shaped retainers.

In a still further embodiment, the present invention includes a radial bearing bushing having a cylindrical interior bore, and one or more retainer bases axially extending into the interior bore. One or more leading edges are attached to each of the one or more retainer bases for retaining a compliant foil trailing edge, and one or more trailing edges are attached to each of the one or more retainer bases for retaining a compliant foil leading edge.

In another still further embodiment, the present invention includes a compliant foil radial bearing having a bushing with an interior bore including one or more retainer bases axially extending into the interior bore and one or more compliant foils. One or more leading edges are attached to each of the one or more retainer bases for retaining a compliant foil trailing edge, and one or more trailing edges are attached to each of the one or more retainer bases for retaining a compliant foil leading edge. One or more foil undersprings are included, each underspring may be disposed beneath a compliant foil. --

In the paragraph beginning in column 3 line 36, in the first sentence between 'While' and 'the' please add -- a preferred embodiment of --.

In the Claims

Please add claims 19-44 as shown below in the full set of all pending claims presented here for the Examiners convenience.

What I claim is:

1. A compliant foil fluid film radial bearing comprising:

a bushing having an interior bore including a plurality of equally spaced generally T-shaped retainers axially extending in said interior bore and a like plurality of lobes between adjacent generally T-shaped retainers;

a shaft rotatably supported within said interior bore of said bushing;

a plurality of compliant foils, with an individual compliant foil disposed in said interior bore of said bushing between adjacent generally T-shaped retainers; and

a plurality of foil undersprings, with an underspring disposed beneath each of said compliant foils between adjacent generally T-shaped retainers.

2. The compliant foil fluid film radial bearing of claim 1 wherein said interior bore is cylindrical and said individual compliant foils and said individual foil undersprings beneath said individual compliant foils establish a converging wedge between adjacent generally T-shaped retainers.

3. The compliant foil fluid film radial bearing of claim 1 wherein said interior bore is non-cylindrical, generally contoured lobes are formed between adjacent generally T-shaped retainers, and said individual compliant foils and said individual foil undersprings generally conform to the shape of said contoured lobes to establish

a converging wedge.

4. A compliant foil fluid film radial bearing comprising:

a bushing having a cylindrical interior bore including a plurality of equally spaced retainers axially extending into said interior bore and a like plurality of arc segments between adjacent retainers;

a shaft rotatably supported within said interior bore of said bushing;

a plurality of compliant foils, with an individual compliant foil disposed in said interior bore of said bushing in each arc segment between adjacent retainers; and

a plurality of foil undersprings, with an underspring disposed beneath each of said compliant foils in each arc segment between adjacent retainers, the radial height of said foil undersprings increasing from its leading edge to its trailing edge to establish a converging wedge on the surface of said compliant foil facing said shaft.

5. The compliant foil fluid film radial bearing of claim 4 wherein said retainers are generally T-shaped.

6. The compliant foil fluid film radial bearing of claim 5 wherein said generally T-shaped retainers are symmetrical.

7. The compliant foil fluid film radial bearing of claim 5 wherein said generally T-shaped retainers are asymmetrical.

8. The compliant foil fluid film radial bearing of claim 7 wherein said generally T-shaped asymmetrical retainers have a crosspiece with a leading edge and a trailing edge, with the leading edge thicker than the trailing edge.

9. The compliant foil fluid film radial bearing of claim 4 wherein the radial stiffness of said foil undersprings increases from its leading edge to its trailing edge.

10. The compliant foil fluid film radial bearing of claim 9 wherein said bearing is hydrodynamic.

11. The compliant foil fluid film radial bearing of claim 9 wherein said retainers are generally T-shaped.

12. The compliant foil fluid film radial bearing of claim 9 wherein said bearing is hydrostatic.

13. A compliant foil fluid film radial bearing comprising:

a bushing having a non-cylindrical interior bore including a plurality of equally spaced retainers axially extending into said interior bore and a like plurality of contoured lobes between adjacent retainers;

a shaft rotatably supported within said interior bore of said bushing;

a plurality of compliant foils, with an individual compliant foil disposed in said interior bore of said bushing in each contoured lobe between adjacent retainers; and

a plurality of foil undersprings, with an underspring disposed beneath each of said compliant foils in each contoured lobe between adjacent retainers, the contour of each lobe between adjacent retainers establishing a converging wedge on the surface of said compliant foil facing said shaft.

14. The compliant foil fluid film radial bearing of claim 13 wherein said generally T-shaped retainers are symmetrical.

15. The compliant foil fluid film radial bearing of claim 16 wherein said generally T-shaped asymmetrical retainers have a crosspiece with a leading edge and a trailing edge, with the leading edge thicker than the trailing edge.

16. The compliant foil fluid film radial bearing of claim 13 wherein said generally T-shaped retainers are asymmetrical.

17. The compliant foil fluid film radial bearing of claim 13 wherein said generally T-shaped retainers include radial openings to provide cooling flow to said interior bore of said bushing.

18. The compliant foil fluid film radial bearing of claim 13 and in addition means to provide cooling flow axially into said interior bore of said bushing.

19. (Newly Presented) A compliant foil fluid film radial bearing comprising:

a bushing having an interior bore including a plurality of generally T-shaped retainers axially extending in said interior bore;

a plurality of compliant foils, with an individual compliant foil disposed in said interior bore of said bushing between adjacent generally T-shaped retainers; and

a plurality of foil undersprings, with an underspring disposed beneath each of said compliant foils between adjacent generally T-shaped retainers.

20. (Newly Presented) The compliant foil fluid film radial bearing of claim 19 wherein said interior bore is cylindrical and said individual compliant foils and said individual foil undersprings beneath said individual compliant foils establish a converging wedge between adjacent generally T-shaped retainers.

21. (Newly Presented) The compliant foil fluid film radial bearing of claim 19 wherein said interior bore is non-cylindrical,

generally contoured lobes are formed between adjacent generally T-shaped retainers, and said individual compliant foils and said individual foil undersprings generally conform to the shape of said contoured lobes to establish a converging wedge.

22. (Newly Presented) The compliant foil fluid film radial bearing of claim 19 wherein said bearing is hydrodynamic.

23. (Newly Presented) The compliant foil fluid film radial bearing of claim 19 wherein said bearing is hydrostatic.

24. (Newly Presented) The compliant foil fluid film radial bearing of claim 19 wherein said generally T-shaped retainers include radial openings to provide cooling flow to said interior bore of said bushing.

25. (Newly Presented) The compliant foil fluid film radial bearing of claim 19 further comprising:

means to provide cooling flow axially into said interior bore of said bushing.

26. (Newly Presented) A compliant foil fluid film radial bearing comprising:

a bushing having a cylindrical interior bore including a plurality of retainers axially extending into said interior bore;

a plurality of compliant foils, with an individual compliant foil disposed in said interior bore of said bushing between adjacent retainers; and

a plurality of foil undersprings, with an underspring disposed beneath each of said compliant foils between adjacent retainers, the radial height of said foil undersprings increasing from its leading edge to its trailing edge to establish a converging wedge of said compliant foil.

27. (Newly Presented) The compliant foil fluid film radial bearing of claim 26 wherein said retainers are generally T-shaped.

28. (Newly Presented) The compliant foil fluid film radial bearing of claim 27 wherein said generally T-shaped retainers are

symmetrical.

29. (Newly Presented) The compliant foil fluid film radial bearing of claim 27 wherein said generally T-shaped retainers are asymmetrical.

30. (Newly Presented) The compliant foil fluid film radial bearing of claim 29 wherein said generally T-shaped asymmetrical retainers have a crosspiece with a leading edge and a trailing edge, with the leading edge thicker than the trailing edge.

31. (Newly Presented) The compliant foil fluid film radial bearing of claim 26 wherein the radial stiffness of said foil undersprings increases from its leading edge to its trailing edge.

32. (Newly Presented) The compliant foil fluid film radial bearing of claim 31 wherein said bearing is hydrodynamic.

33. (Newly Presented) The compliant foil fluid film radial bearing of claim 31 wherein said bearing is hydrostatic.

34. (Newly Presented) The compliant foil fluid film radial bearing of claim 27 wherein said generally T-shaped retainers include radial openings to provide cooling flow to said interior bore of said bushing.

35. (Newly Presented) The compliant foil fluid film radial bearing of claim 26 further comprising:

means to provide cooling flow axially into said interior bore of said bushing.

36. (Newly Presented) A compliant foil fluid film radial bearing comprising:

a bushing having a non-cylindrical interior bore including a plurality of retainers axially extending into said interior bore;

a plurality of compliant foils, with an individual compliant foil disposed in said interior bore of said bushing between adjacent retainers; and

a plurality of foil undersprings, with an underspring disposed beneath each of said compliant foils between adjacent retainers, the contour of the interior bore between adjacent retainers establishing a converging wedge on the surface of said compliant foil.

37. (Newly Presented) The compliant foil fluid film radial bearing of claim 36 wherein said retainers are generally T-shaped.

38. (Newly Presented) The compliant foil fluid film radial bearing of claim 37 wherein said generally T-shaped retainers are asymmetrical.

39. (Newly Presented) The compliant foil fluid film radial bearing of claim 38 wherein said generally T-shaped asymmetrical retainers have a crosspiece with a leading edge and a trailing edge, with the leading edge thicker than the trailing edge.

40. (Newly Presented) The compliant foil fluid film radial bearing of claim 37 wherein said generally T-shaped retainers are symmetrical.

41. (Newly Presented) The compliant foil fluid film radial bearing of claim 37 wherein said bearing is hydrodynamic.

42. (Newly Presented) The compliant foil fluid film radial bearing of claim 37 wherein said bearing is hydrostatic.

43. (Newly Presented) The compliant foil fluid film radial bearing of claim 37 wherein said generally T-shaped retainers include radial openings to provide cooling flow to said interior bore of said bushing.

44. (Newly Presented) The compliant foil fluid film radial bearing of claim 36 further comprising:

means to provide cooling flow axially into said interior bore of said bushing.

45. (Newly Presented) A radial bearing bushing comprising:

a bushing having an interior bore;
one or more retainer bases axially extending into the interior
bore;
one or more leading edges attached to each of the one or more
retainer bases for retaining a compliant foil; and
one or more trailing edges attached to each of the one or more
retainer bases for retaining a compliant foil.

46. (Newly Presented) The radial bearing bushing of claim 45
wherein one or more of the one or more retainer bases include
radial openings to provide cooling flow to said interior bore of
said bushing.

47. (Newly Presented) The radial bearing bushing of claim 45
wherein the interior bore is cylindrical.

48. (Newly Presented) The radial bearing bushing of claim 45
wherein the interior bore is non-cylindrical.

49. (Newly Presented) A compliant foil radial bearing comprising:
a bushing having an interior bore including one or more
retainer bases axially extending into the interior bore;
one or more compliant foils
one or more leading edges attached to each of the one or more
retainer bases for retaining a compliant foil trailing edge; and
one or more trailing edges attached to each of the one or more
retainer bases for retaining a compliant foil leading edge; and
one or more foil undersprings, each underspring disposed
beneath a compliant foil.

50. (Newly Presented) The compliant foil radial bearing of claim 49
wherein the interior bore is cylindrical and an individual
compliant foil and underspring beneath the individual compliant
foil form a converging wedge.

51. (Newly Presented) The compliant foil radial bearing of claim 49
wherein the interior bore is non-cylindrical, generally contoured
lobes are formed between adjacent retainer bases, and an individual

compliant foil and underspring beneath the individual compliant foil generally conform to the shape of a contoured lobe to establish a converging wedge.

52. (Newly Presented) The compliant foil radial bearing of claim 49 wherein said bearing is hydrodynamic.

53. (Newly Presented) The compliant foil radial bearing of claim 49 wherein said bearing is hydrostatic.

54. (Newly Presented) The compliant foil radial bearing of claim 49 wherein the one or more retainer bases include radial openings to provide cooling flow to the interior bore of said bushing.

55. (Newly Presented) The compliant foil radial bearing of claim 49 further comprising:

means to provide cooling flow axially into the interior bore of the bushing.

R E M A R K S

Applicant's allowed patent claimed less than that to which applicant was entitled. The new claims presented herein more accurately reflect the breadth of applicants invention as disclosed in the originally filed specification.

Applicant respectfully requests that the Examiner consider the claims, allow the claims, and pass this case to issue.

Respectfully Submitted,


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